Space Weather Forecast

Issued on Tuesday, 06 August 2024 at 01:11 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

---

Space Weather Forecast Headline: Minor/Moderate radio blackouts (R1/R2) expected. Chance of minor solar radiation storm S1 slowly declining.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Activity was high, with numerous large X-ray flares from diverse sources, peaking with a long-period Strong-class event from a sunspot region (departing the western solar horizon) at 05/1340UTC, closely followed by a second Strong-class flare from a region in the southeast at 05/1527UTC.

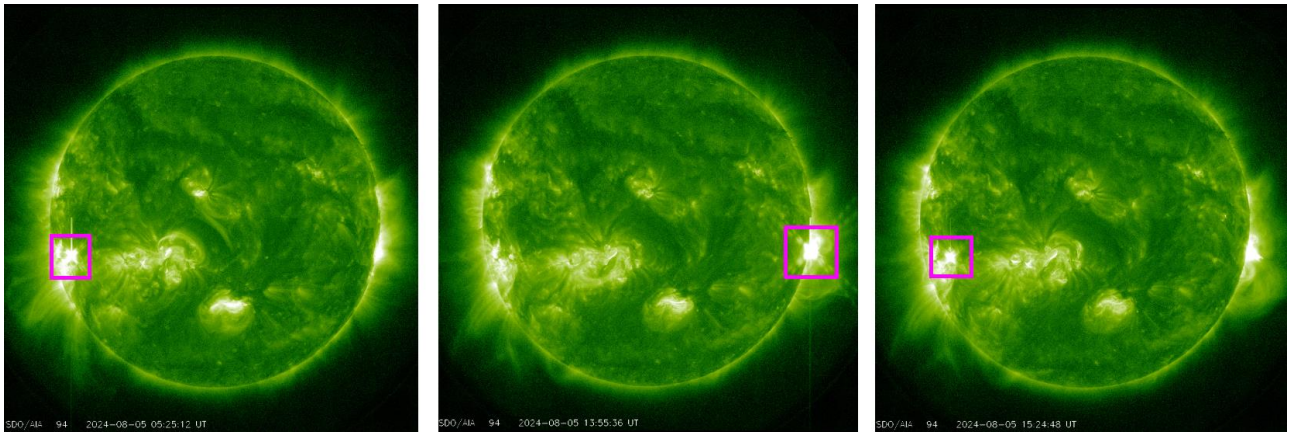

Figure 1: False-colour extreme UV imagery of the sources (boxed magenta) of the three largest X-ray flare events of the past 24 hours. The rightmost source region is no longer on the Earth-facing side of the Sun.

There are now up to ten sunspot regions on the facing side of the Sun, with two small magnetically 'unipolar' regions developing as the larger and most active group became indistinct on the western solar horizon. Of the surviving sunspot regions, by far the largest and nominally the most complex has been one responsible for the second Strong-class X-ray flare, currently dominating the southeastern quarter of the facing side of the Sun.

The main solar region changes otherwise observed in recent hours have been proliferation in the trailing portion of a central sunspot responsible for a Moderate class flare in the past 24 hours, while the region that generated the second aforementioned Strong-class flare showed similar development in its leaders, although some of the more eastern detail is likely hidden by the viewing angle.

There have been numerous Coronal Mass Ejections (CMEs) seen in satellite imagery in the period. The Strong-class flares produced CMEs with apparently peripheral trajectories (to be confirmed by recently submitted MOSWOC modelling). In addition to these, a 'filament eruption'

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2024. All Rights Reserved.

(arc of plasma) was observed to leave the northeast at 05/0530UTC, with a second leaving the southeast at 05/0930UTC. Finally, a third possible filament eruption was perhaps observed around 05/1837UTC from a sunspot group in the southeast-central part of the Sun. Imagery to ascertain as to whether any ejecta was associated with this final event is not yet available at the time of writing.

All considered, at present no Earth-directed CMEs have been identified, with the possible main exception of the southeast-central event, and acknowledging modelling results have yet to become available for the Strong-class-linked events.

Solar Wind / Geomagnetic Activity: Much of the past 24 hours' solar wind behaviour does not have a definitively identified cause, however the residual effects of the 01 Aug CME were then perhaps followed by further weak transient arrivals and then possible minor fast wind characteristics.

The solar wind showed solar wind speeds that were initially slightly elevated, rising to become elevated into the past UTC afternoon and then abating slightly by the period's end. The number of particles in the solar wind was erratic, but contained within typical background levels. The associated magnetic field was elevated, but the north-south component was fortunately almost entirely co-aligned with Earth's field to greatly limit geomagnetic activity in the most recent 24-hour period. The net result of the above solar wind measures was mostly quiet.

Energetic Particles / Solar Radiation: Solar radiation levels rose from resting background levels in response to the long-period Strong-class flare from an off-going sunspot region on the western solar horizon. The spectral response was hard but not high in magnitude, with 100MeV proton levels peaking at roughly 0.5pfu before plateauing (where 1pfu necessitates a MOSWOC-issued alert), while 10MeV have shown a later apparent peak near 3.5pfu as of the time of this bulletin (i.e. below S1 minor solar radiation storm levels which begin at 10pfu).

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate to high solar activity is forecast to continue, with occasional Moderate-class flares expected and with a chance of isolated Strong-class flares.

Solar Wind /Geomagnetic Activity: No CMEs nor significant fast winds currently feature in the forecast, although imagery and modelling are awaited for some of the past 24 hours' events. More reliably quiet geomagnetic activity is expected through the UTC midweek period, although confidence in its continuation falls off before the UTC weekend.

Energetic Particles / Solar Radiation: There is a chance of minor solar radiation S1 or greater events at first given the recent history of an off-going sunspot region and the currently raised proton counts in the near-Earth environment, however this risk should relax to a daily slight chance after UTC midweek.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2024. All Rights Reserved.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	1	1	5
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	80	80	80	80
Very Active	R3 to R5 X	Yes	25	20	20	20

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	25	20	15	15
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2024. All Rights Reserved.